About Our CONTRIBUTORS

LAMAR WALDRON HARRIS, D.D.S. (Chicago College of Dental Surgery, 1929) is also among the first research workers to report successes in new applications of plastics in the field of dentistry—this time on THE USE OF ACRYLIC RESIN FOR JACKET RESTORATION. Last month in this magazine Doctor Harris described ANTERIOR ALL-PORCELAIN RESTORATIONS.

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WILLIAM EDGAR WILSON was graduated with the degree of D.D.S. from the St. Louis University School of Dentistry in 1919. Doctor Wilson is a general practitioner who is one of the pioneers in the field of plastics as applied to dentistry, having been engaged in ten years' research on these new materials. Doctor Wilson receives editorial mention in this issue along with Doctors Kelly and Harris.

•

ORIE JOHN GATES, D.D.S. is a graduate of Northwestern University Dental School, class of 1918. Doctor Gates is a general practitioner who knows a practical suggestion for general practitioners and offers it in this issue under the title: A SIMPLE METHOD OF VERIFYING THE ACCURACY OF PARTIAL DENTURE IMPRESSIONS.

•

GILBERT V. KING, D.D.S. (Marquette University School of Dentistry, 1928) was co-author with N. E. Uelmen of Milwaukee of ESTHETICS FOR THREE-QUARTER CROWNS in the October, 1939 DIGEST.

•

OTTO MEYER, M.D. is a graduate of Rostock University, Germany, of the year 1921. He is the author of more than forty articles published in medical journals and the author of two books: one on RHEUMATISM, the other PHLEBITIS. Doctor Meyer was a member of the presiding committee of the Fourth International Rheumatism Congress. Phlebology is the particular phase of medical practice in which he is interested. Doctor Meyer's present article, THE MECHANISM OF ORAL FOCAL INFECTION, again opens the theories of focal infection to challenge and discussion. He writes: "In discovering the connection between diseased teeth and latent chronic infection of the jugular veins, I believe I have found the missing link in the theory of focal infection." His explanation is to be found on page 208 of this issue.

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C. N. VAN RIJSWIJK, Dr. Dent. Surg. occupies the Clinical Digest department this month. Doctor Van Rijswijk wrote hopefully from Holland last January: "It certainly was good to hear of the American people's concern about our country's difficulties in these trying times. We still hope, though, not to be involved. Be convinced that I am very grateful for the kind thoughts of your nation which I got to love as my own during the very short period I have been permitted to stay there. I am anxious to hear if somebody might suggest another method of handling the problem with which my short article is concerned." Doctor Van Rijswijk is the dentist from Holland referred to in the March Notes on the Cuff.

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708 Church Street, Evanston, Illinois

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The Use of Acrylic Resin for Jacket Restoration

LA MAR W. HARRIS, D.D.S., Chicago

MY INTEREST IN TOOTH color acrylic was first aroused during research in collaboration with E. Byron Kelly[1] who developed the tooth colors for use in full denture splints. Splints are transitional dentures used during the period between extraction and the placing of so-called permanent dentures. They are designed to retain or force the injured mouth tissue into favorable healing position. Having tooth-colored acrylic in place of porcelain teeth, they are not only lighter in weight but can be made to duplicate exactly the shape and position of natural teeth. The natural color, strength, and light reflection of the acrylic so closely imitated human teeth that I soon became interested in its use for jacket crowns and simple inlays, with the result that, following considerable experimentation and study, acrylic may now be used for that purpose with satisfaction and success.

Color

Various tooth colors are acquired by adding carefully tested, permanent dyes to clear acrylic powder. These dyes in most cases are pigment dyes, with occasional vegetable dyes used for uniformity. Care is taken not to use dyes containing lead, arsenic, or antimony, which may have some injurious effect.

Preparation of the tooth for acrylic restoration is the same as for porcelain jackets with one exception: the shoulder may have a slight bevel. The same care previously described[2] must be exercised throughout this technique. The same copper band impressions, matrix, plaster impression, and pink wax bite are used in the acrylic restoration, and the procedure will be continued here from that point. Figs. 1 and 2 show the practical case chosen to illustrate the technique.

[1]Kelly, E. B.: Surgical Denture Splints: A New Method in Immediate Denture Service, to be published in the July issue of The Dental Digest.
[2]Harris, L. W.: Anterior All-Porcelain Restorations, THE DENTAL DIGEST, 46:168 (May) 1940.

Technique

1. Surround the copper band with a thin layer of pink wax (Fig. 3, left) and invest it into a conical ring containing plain plaster. The plaster should come to the top of the wax, which in turn is approximately 5 mm. higher than the band impression (Fig. 4). When the plaster has set, pack amalgam into the impression, by packing, vibrating, and pressing. This can be done without distorting the band which is protected by the plaster. Let the amalgam set overnight; remove from the impression and shape the root-end into a cone, with the shoulder preparation as the widest point. Prepare a groove on either or both sides of the root end to insure proper return to the master model each time.

2. Take an impression of the amalgam die with the same copper band used originally. Pour, by vibration, a white stone die for use later in the procedure (Fig. 3). This die may also be poured with S. S. White pure white zinc cement. This will eliminate foiling the die as neither the acrylic nor the cement is affected during the process. In finishing the jackets, remove the greater portion of cement with a bur and dissolve the remainder with muriatic acid. The acid will not attack the acrylic.

3. Carefully apply tin foil to the amalgam die with a .0005 gauge foil, in the same manner as foiling with platinum for porcelain jackets. Cover this with a thin layer of sticky wax and a layer of kryptex or cement to form the undersized jacket matrix which is returned to the root of the tooth prior to taking a plaster impression (May, 1940, DENTAL DIGEST, Figs. 14, 15, 16, 17, and 18).

4. Seat the amalgam die properly into the matrix in the impression and pour the model of stone, making certain that the die is oiled on the root-end to facilitate removal. When the cast has set, separate and make an opening from which to push out the die. Put the bite to place and mount on an articulator.

5. With the model prepared and the amalgam die in place (Fig. 5) again carefully tin-foil the die. There must be no break in the foil. Follow this with a thin layer of sticky wax for stability during carving. Using either pink base-plate or blue inlay wax, carve the desired shape of the crown on the model (Fig. 6).

6. Transfer the wax carving, with foil attached, to the duplicate stone die. Make certain that the foil is not distorted and that the positioning is exact. Burnish the overlapping fine edge of foil against the root-end above the shoulder. The stone die and carving are then seated into the investment in the lower half of the flask with the shoulder of the die and the wax carving approximately 2.5 mm. above the top of the investment (Fig. 7). This positioning in the flask creates a "shut off" valve and gives assurance that the acrylic will be cured under pressure. (The investment is made of three parts white stone, three parts quick-setting plaster, and two parts fine sand, by bulk.) When the investment has set, cover the wax carving with a .002 foil (Fig. 8). Paint investment with soap or some other separating medium and invest into the upper part of the flask. Keep the flask under pressure in a vise or clamp until the investment has set.

7. Immerse the flask into a container of water which is then heated to the boiling point; remove from the water and separate the two halves of the flask. Thoroughly remove the wax residue with chloroform or carbon

Fig. 1—Patient before treatment.

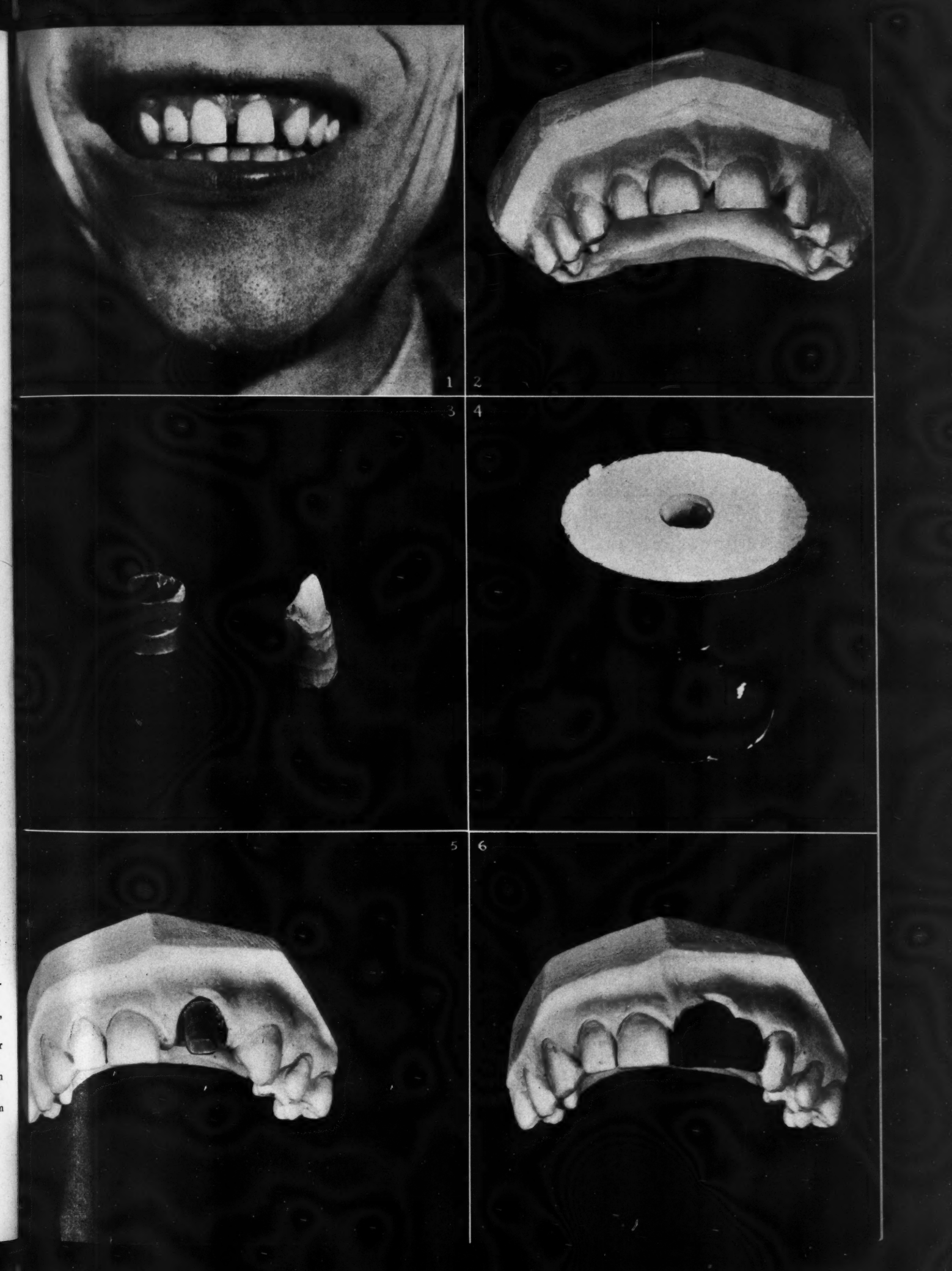
Fig. 2—Plaster model of mouth before treatment.

Fig. 3—Copper band surrounded with wax, and duplicate stone die.

Fig. 4—Surrounded band invested in plaster in conical ring.

Fig. 5—Stone model with amalgam die in place.

Fig. 6—Stone model with waxed carving in place.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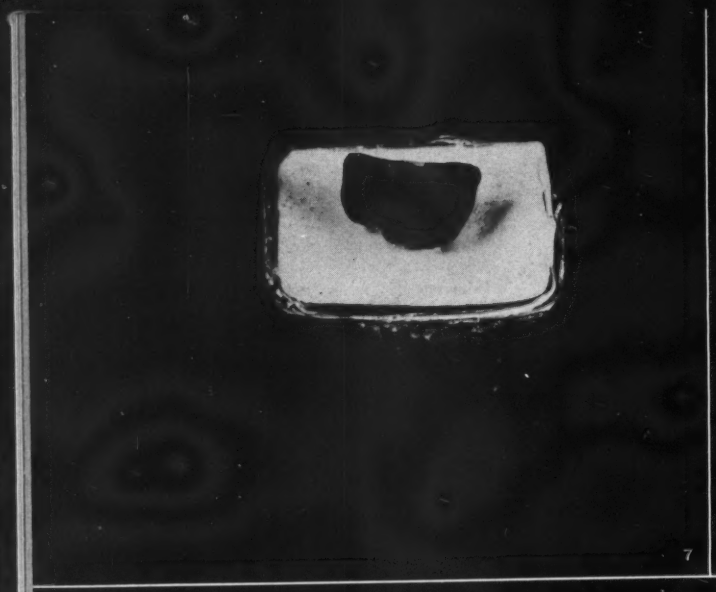

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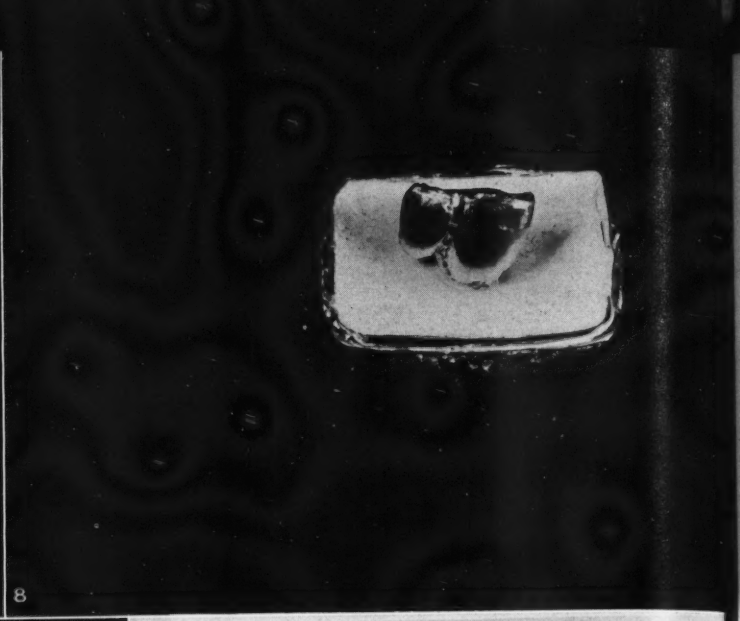

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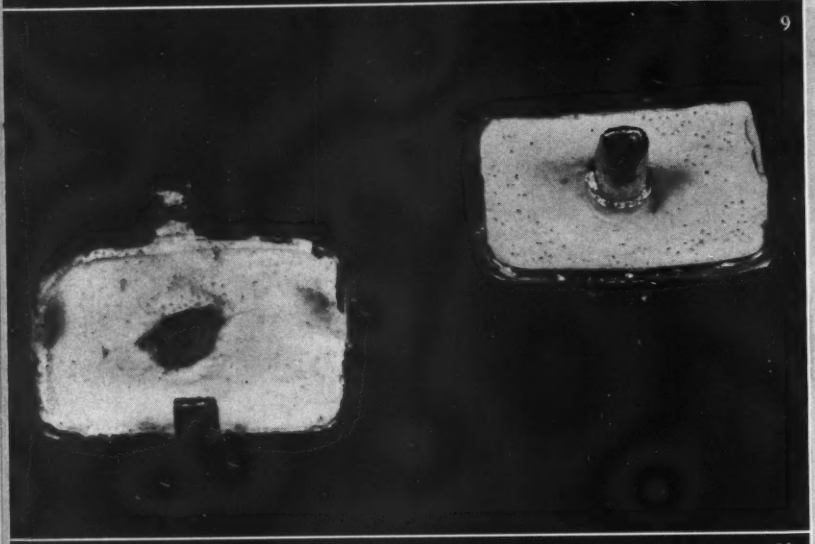

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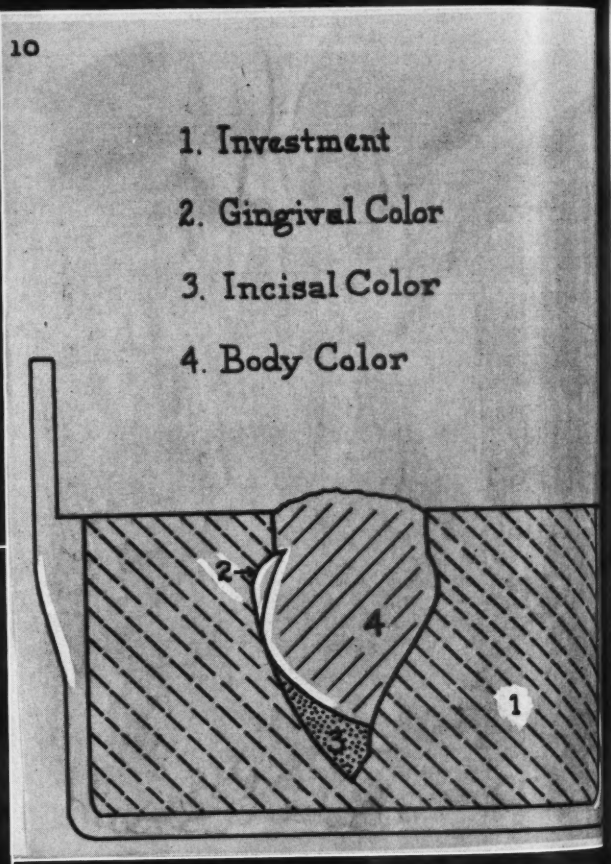

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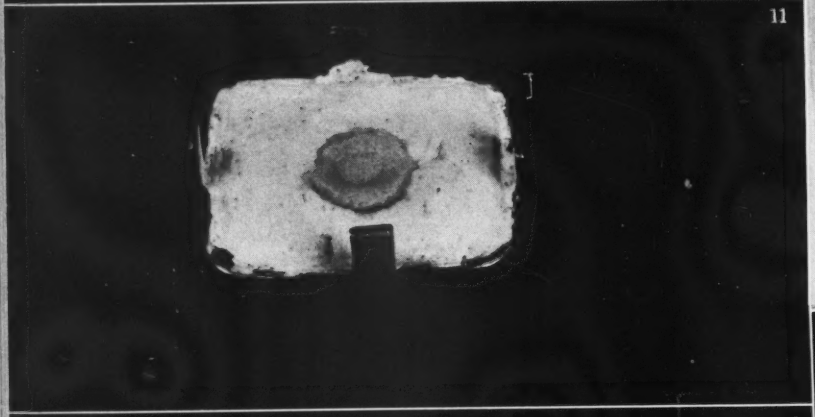

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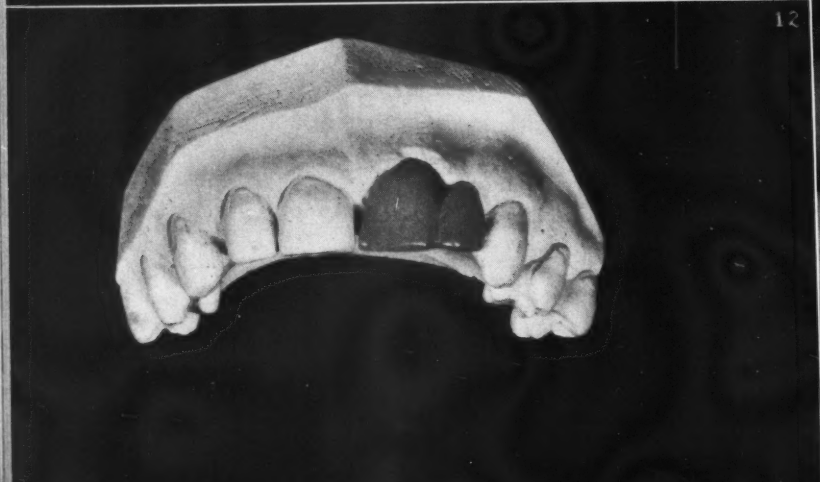

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Fig. 7—Waxed carving and stone die invested in lower half of flask.

Fig. 8—Waxed carving completely tin-foiled

Fig. 9—Both halves of flask after boiling out wax and separating.

Fig. 10—Diagrammatic drawing showing packed acrylic ready for curing.

Fig. 11—Upper half of flask packed ready to cure.

Fig. 12—Crown completed and returned to original amalgam die and model.

Fig. 13—Patient after treatment.

tetrachloride. The flask (Fig. 9) with the tin-foiled stone die in the bottom and the tin-foiled negative of the crown in the top is ready to be packed with acrylic.

8. Weigh and mix thoroughly the powdered acrylic tooth colors (polymer). Approximately 8 grains of tip color, 10 grains of body color, and 6 grains of gingival color are needed for each crown. Mix in three different, round-bottom glass jars with stainless steel spatulas. Add one part of liquid (monomer) to two parts of powder by bulk, or 1 cc. liquid to 35 grains of powder, and thoroughly mix the tip color. Cover with a tight lid and let stand for about ten minutes while the body and gingival colors are mixed in order and both colors are then covered. The tip color will now be heavy and stringy and ready for packing into the warm (not hot) upper half of the flask containing the negative crown. Using small portions at a time, pack the tip color in any desired position, remembering to carry this color higher on the mesial and distal than in the center, and to flatten the edges to insure a blended appearance. The gingival color can also be placed in any desired position. Allow a few minutes before packing the body color, during which time the tip and gingival colors will dry sufficiently to keep colors from running together. Packing small portions at a time is the best insurance against trapping air during the process. The operator can exercise any amount of ingenuity, as a few experiments will prove, in staining or marking. The case shown has pink denture color at the V-shaped apparent bifurcation. The diagrammatic drawing (Fig. 10), and Fig. 11 show the flask packed ready to be placed in position with the lower half and cured. Note that the body color is packed to slight excess to insure curing under compression.

9. Place the clamp on the flask, which is then closed to the point where it offers resistance to hand pressure, usually between 2 mm. and 3 mm. of being closed. Immerse in a container of glycerin which is between 100° F to 125° F. and slowly carry the temperature to 175° F. At this point begin closing the flask. Tighten the clamp at intervals until the temperature reaches 200° F., at which time the flask should be completely closed. The temperature can then be carried rapidly to 250° F. and held there for twenty-five minutes before it is allowed to drop.

Remove the flask from the glycerin and place in hot water, the temperature of which is gradually lowered by the addition of cold water. When the flask is thoroughly cooled, remove the clamp; separate the two halves of the flask and remove the jacket. The plaster die may be removed with a bur.

Inasmuch as the desired shape was carved into the wax, little finishing is necessary. The acrylic having touched only the tin foil a gloss is already acquired and a few seconds' buffing with a rag wheel and whiting give a life-like gloss.

The finished jacket is shown on the model in Fig. 12 and in place in the patient's mouth in Fig. 13.

The case shown was one chosen because of its unusual problem, and with the thought that it might offer a solution to others who may have encountered the same condition. The duplication of tooth color and texture added to the light reflection has in this, as well as other cases, made an outstanding restoration from the esthetic and practical standpoints. Of importance also is the fact that the gum tissue takes kindly to the highly glazed surface of the acrylic.

25 *East Washington Street.*

Adaptation from the Literature

[H. D. Palmer, M.D. and Myrna Kempf, B.A.: The Journal of the American Medical Association, 113:1788 (November 11) 1939.]

THE AUTHORS REPORT (1) the study of clinical cases with postmortem examinations, and (2) bacteriologic examinations of the teeth and blood of persons undergoing tooth extraction. The purpose of the study was to determine the frequency of bacteremia and its consequences following tooth extraction.

Outline Summary of Bacteremia Study

1. Seventeen per cent of a group of eighty-two patients who had not had more than two teeth extracted had transient bacteremia.

2. In 13.4 per cent the organism was Streptococcus viridans.

3. In four cases of subacute bacterial endocarditis the onset of septic symptoms dated from the time of dental extraction.

4. Bacteremia is present in an appreciable number of cases of severe oral sepsis independent of operation. The organisms find their way into the circulation from such foci.

5. Streptococcus viridans is constantly present in alveolar infection. When these infected areas are traumatized there is a dispersion of the organisms through the blood stream in a high percentage of cases.

6. The percentage was found to be roughly parallel to the severity of the infection and to the extent of the operative procedure.

7. In persons with a normal vascular system and normal defense to this form of bacteremia, the circulation is usually cleared of the organisms in a few minutes.

8. In persons with pre-existing rheumatic valvular lesions or congenital defects in the heart, this transient bacteremia, frequently following dental operations, may incite bacterial endocarditis.

Fig. 1

Fig. 2

Fig. 1—Removing inlay wax pattern from cavity with sprue. Cavity preparation is the same as with gold inlay. Edge beveled or straight. Pin retention can be used as with gold inlay.

Fig. 2—Pouring wax pattern with special investment used for this purpose, in flask as shown. After investment has set, remove sprue, boil out wax, and dehydrate mold to correct casting temperature.

The Casting of Plastic Inlays and Crowns

W. E. WILSON, D.D.S., Springfield, Illinois

SINCE THE INTRODUCTION of the cast gold inlay, dentistry had no other medium than metals and porcelain for use in operative restorations until chemical science opened the field of plastics. We have all come to recognize their value in denture service, but that has seemed only a part of their adaptability to dentistry. After ten years of experimentation which involved inserting hundreds of cast plastic inlays and crowns in mouths under tests, I believe that the profession can now be assured of a new procedure in restoring lost tooth structure.

It is not the purpose for the present to give at length the complete details of the research. Most of the major problems have been overcome in simplifying a technique and perfecting a machine for this form of casting. In recent years two good plastics have been developed for commercial use, namely, polystyrene and methacrylate. The basic specifications of both are especially satisfactory as they are highly resistant to acids, alkalies, oils, and alcohols. They have also been found to be extremely low in water absorption. In the field of plastics, it is a common practice by fillering, interpolymering, plasticizing, and many other methods of manufacture to develop from a basic plastic a wide range of formulas. In this manner the undesirable qualities both chemically and physically are overcome. Many studies have been made in an effort to standardize their specifications and to raise the basic qualities, but because of their complexity, it is impossible in this report to give a specific formula. The ideal would be to have the strength of casting gold.

Inasmuch as the dental profession is familiar with the endurance of the cast gold inlay, it may simplify the

Fig. 3—Inserting premolded plastic biscuit in heating chamber to be heated to correct flow point.

Fig. 4—Placing dehydrated heated mold over heating chamber preparatory to casting. Set time clock at correct time for casting cycle.

Fig. 3

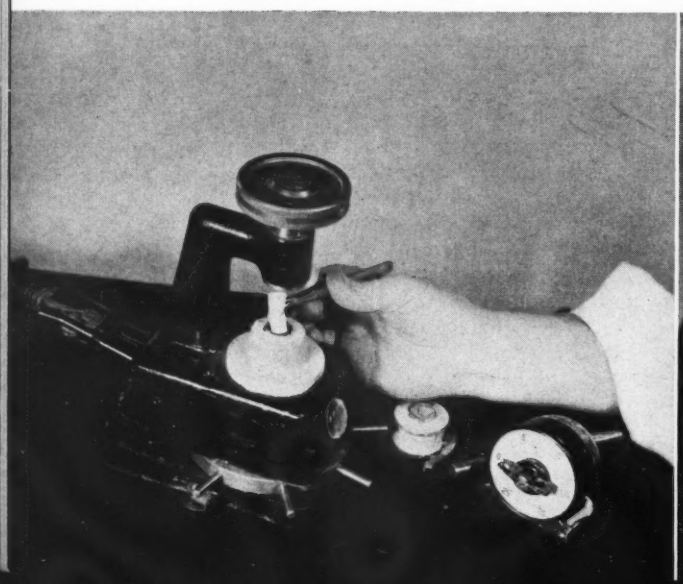


Fig. 4

Fig. 5—Casting inlay.

Fig. 6—Removing cast plastic inlay from flask.

explanation to compare gold with the physical qualities of the two plastics that proved satisfactory among the many tests in this research problem. Hardness, tensile strength, elongation, impact, and thermo-conductivity are important factors in operative restorations. The accompanying table offers a comparative analysis of these properties in gold and plastic.

Comparative Analysis of Properties in Gold and Plastic

Brinell Hardness	Pure gold 15-25 Alloyed gold 50-75	Normal 20-25 Fillered and plasticized 40-60
Tensile Strength	10,000 to 45,000 lbs.	5,000 to 9,000 lbs. Fillered 15,000 to 30,000 lbs.
Elongation	15-25	5-15
Impact	30,000	5,000 to 15,000
Thermo-conductivity	High	Low

Shading

The problem of shading has been given careful consideration and it has been found that methacrylate and polystyrene, being clear water color, are particularly adaptable because their natural translucency lends itself to any of the shades that are in common use in the latest development for anterior teeth in denture service.

Cavity Preparation

The same care should be used in preparing the cavity as is used for the gold inlay. A clean-cut cavity with polished walls and sharp cavo-surface angles aid in the ideal plastic inlay. Pins, slots, and grooves can be used for added retention. All traces of tooth shavings, blood, and débris should be eliminated and the cavity washed with warm water.

Investing Pattern

The wax pattern having been completed and adjusted, the surfaces should be cleaned with wax solvent to secure a smooth casting. The pattern is then ready to be invested. The size of the sprue-former can be varied according to that of the wax pattern as the machine is so designed as to assure proper pressure in casting. The sprue must be perfectly clean to prevent the marring of the walls of the sprue-hole. Any loose plaster might be dislodged in the process of casting and create a flaw in the finished inlay. The sprue-former should be inserted in the greatest bulk of the wax pattern so that the plastic when cast will force evenly. After the pattern has been properly sprued, it should be cleaned with a camel's hair brush dipped in hydrogen dioxide to eliminate the possibility of a faulty mold and sprue-hole.

A special investment had to be developed as none of the standard types were satisfactory.

1. It was found advisable to weigh the amount of the investment to be used and to measure a given unit of water to insure a thick creamy mix.

2. The wax pattern is then painted with a camel's hair brush dipped in the investment which is vibrated to prevent trapped air bubbles in any of the angles.

3. Making sure that the pattern is thoroughly covered, carefully insert the sprue in the sprue-hole at the base of the flask.

4. The split walls of the flask are set in place and the investment completed and again vibrated.

5. The top of the flask is put over the ring. The flask is so designed that the investment is completely encased with metal because of the forces of casting.

6. After allowing thirty minutes for setting, the sprue is removed and the wax is boiled out.

7. The flask is dehydrated to evaporate all the water from the investment.

8. The mold is gradually heated to 400° F.

Casting Machine

For the casting of plastic inlays and crowns, a machine with a controlled press and heating chamber was constructed. The features of this machine are as follows: (1) Controlled temperature by proper wiring of heating element around plastic chamber; (2) control of force to be used in casting; (3) pressure sufficient to insure casting; (4) sufficient pressure to overcome mold shrinkage; (5) sufficient pressure to eliminate possibility of faulty casting, such as trapped air and internal strains, and (6) control to know when casting has been acquired.

The nature of plastics requires careful heating consideration as the plastics can lose strength and shading through burning, thus affecting the desired esthetics and service in the mouth.

Casting

1. The machine is heated for about one-half hour previous to casting. A premolded plastic biscuit of a suitable shade for the tooth to be restored is then put into the heating chamber.

Fig. 7—Placing plastic inlay in cavity.

Fig. 8—Finished plastic inlay showing finishing stones, sanding disks, buffers, and cocobutter; also, shade guides

2. Next the dehydrated superheated flask is placed over the chamber containing the plastic and locked so that it will not give during the process of casting.

3. The time clock is then set for ten minutes which brings the plastic to the proper flow point.

4. Hand-forced pressure is then gradually applied, the plastic being forced through the sprue-hole into the mold. This pressure will not overforce the plastic into the mold or cause over-casting.

5. The flask is removed from the machine and set aside to cool at room temperature.

6. The finished cast is cleaned with a brush and soap and water. Alcohol may be used to eliminate any plaster that may have become firmly attached to the casting.

Polishing, Finishing, and Setting in Mouth

The inlay or crown is polished in the mouth with sandpaper, fine stones, and polishing disks, with cocobutter as a lubricant. The margins should be burnished against the cavosurface walls. If care is used, the margins can be corrected by the use of a heated burnisher. The crown or inlay is removed from the mouth, and cleaned with alcohol; then dried.

1. Cotton rolls are placed in the area of the mouth to be walled off from moisture and the cavity is examined for débris, then washed and dried.

2. The cement must be worked slowly to a thin mix because the accuracy of the reproduction of the wax pattern to a thousandth part of an inch does not leave as much space as does the cast gold inlay.

3. With an instrument, cement is placed in a thin layer over all surfaces of the cavity walls and cavity surface of the inlay.

4. The inlay is seated.

5. A slight tapping with a mallet and orangewood stick will complete the setting.

6. After the margins are wiped clean and while the cement is still soft, a check is again made to be sure the casting is in place. The field is kept dry until the set has taken place.

The final polishing is done with cocobutter and fine felt wheels. Floss is passed between the teeth when contact cavities are being restored to remove any cement particles. The occlusion is checked with tracing paper for high spots and the mouth is sprayed with warm water.

Fortunately plastics seem to have a better affinity for the dental cements used for gold than does gold itself. This may be due to acid in the liquid and the thin mix used. It has been possible to study the reaction of cements in the use of polystyrene and methacrylate during the last four years because of their transparency. At present no noticeable change has taken place.

Advantages of Plastics for Inlays and Crowns

1. Plastics provide the ideal in esthetics.

2. Polystyrene and methacrylate will retain their color indefinitely.

3. They are excellent non-conductors to thermo-changes.

4. The specific gravity is low.

5. There is high resistance to moisture.

6. Food and liquids taken into the mouth do not affect the plastics used.

7. The mouth tissue tolerance is excellent.

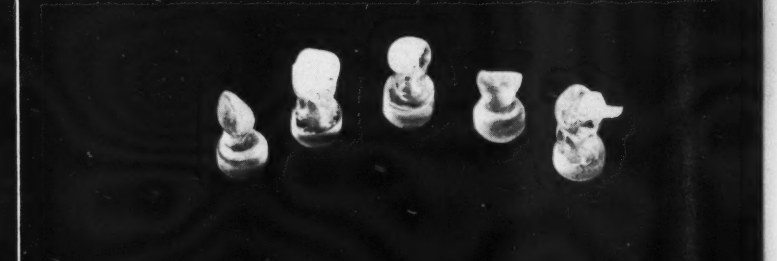
8. Plastics are easy to finish and polish.

Comment

Dentistry may well follow the lead of industry by extending the use of plastics beyond the present limited scope. Plastics can also be used in the casting of bridge pontics, partial restorations, porcelainized jacket crowns and complete bridges.

704 *Myers Building.*

Figs. 9 and 10—Models of various shapes and sizes of teeth without and with plastic inlays.



A Simple Method of Verifying the Accuracy of Partial Denture Impressions

O. J. GATES, D.D.S., Fort Atkinson, Wisconsin

A PERFECT MODEL of the mouth must be had before lost teeth may be restored with any partial restoration that will give balanced function. In order to be sure that the model is an exact duplicate of conditions found in the mouth the technique to be described has been developed.

A stone model is made by any method that works best for the operator; then the check-bite is constructed which will be used to prove whether the impression and model are accurate.

Construction of Check-Bite

1. Eliminate all undercuts on the stone model by placing soft wax around the teeth, leaving only the incisal and occlusal portions exposed (Fig. 1). This will facilitate removal of the plaster check-bite after it has set.

2. Apply separating medium to the model.

3. Make a mix of any good impression plaster that does not set too fast or too hard. This will permit the check-bite to be trimmed easily.

4. Grasp the model in the left hand with the thumb in the palatal area and the index finger outside the teeth.

5. Build up the plaster about 1 inch high and one-half inch wide over the teeth, the ridges, and across the palate approximately where the palatal bar will be in the finished case. This building up in plaster must be done while the plaster is still soft and workable in order to get around all sides of the arch and across the palate with the one mix. When this has been done, if the check-bite is not high enough, add another mix for additional height. The original mix, however, should be of one pouring to prevent fracture in separating. One could use modeling compound or clay to fill the palatal and outer areas with the same result, but it would take more time.

6. As the plaster is setting, trim the check-bite with a sharp knife or spatula almost to the size desired when finished (Fig. 2). Let the plaster set until it is hard.

7. By applying a little heat the wax used to fill in the undercuts (Fig. 1) will soften slightly.

8. Hold the model firmly on a flat surface and gently lift the check-bite off the model (Fig. 3).

9. With a sharp knife, trim the plaster down almost to the incisal and occlusal edges of the teeth, and make the areas touching the crest of the alveolar ridges and across the palate about one fourth of an inch to three eighths of an inch wide and about half an inch thick (Fig. 4).

10. Check to find whether the model obtained from the original impression is an exact duplicate of the mouth. This is done by wetting the plaster check-bite slightly and trying directly in the patient's mouth. If it touches all areas as it did on the model over which it was poured, the finished casting will be satisfactory. If the check-bite can be rocked in the mouth, and if by holding the check-bite firmly in place, light will show under the bar area and saddle areas —then the impression is faulty. The entire procedure will then have to be

Fig. 1—Stone model with wax properly placed to prevent undercuts preparatory to pouring check-bite.

Fig. 2—Plaster check-bite as poured over model shown waxed in Fig. 1 and roughly carved while plaster is setting for 10 or 15 minutes before removal from model.

Fig. 3 (top left)—Plaster check-bite as it appears when removed from model, with wax placed on model, as in Fig. 1, adhering to check-bite.

Fig. 4 (top right)—Wax removed and check-bite trimmed to proper size for placing in the mouth to see whether model is an accurate duplication of mouth.

Fig. 5 (bottom)—Check-bite as in Fig. 4 placed back on original model, as it should fit in mouth if model is an accurate duplication.

repeated. A new impression, new model, and new check-bite will have to be made repeatedly until the check-bite fits in the mouth exactly as it does on the model over which it was made.

If the accuracy of the model and impression are ascertained by the method described, sore abutment teeth and sore spots under the bar will be eliminated, and a well balanced restoration will be produced.

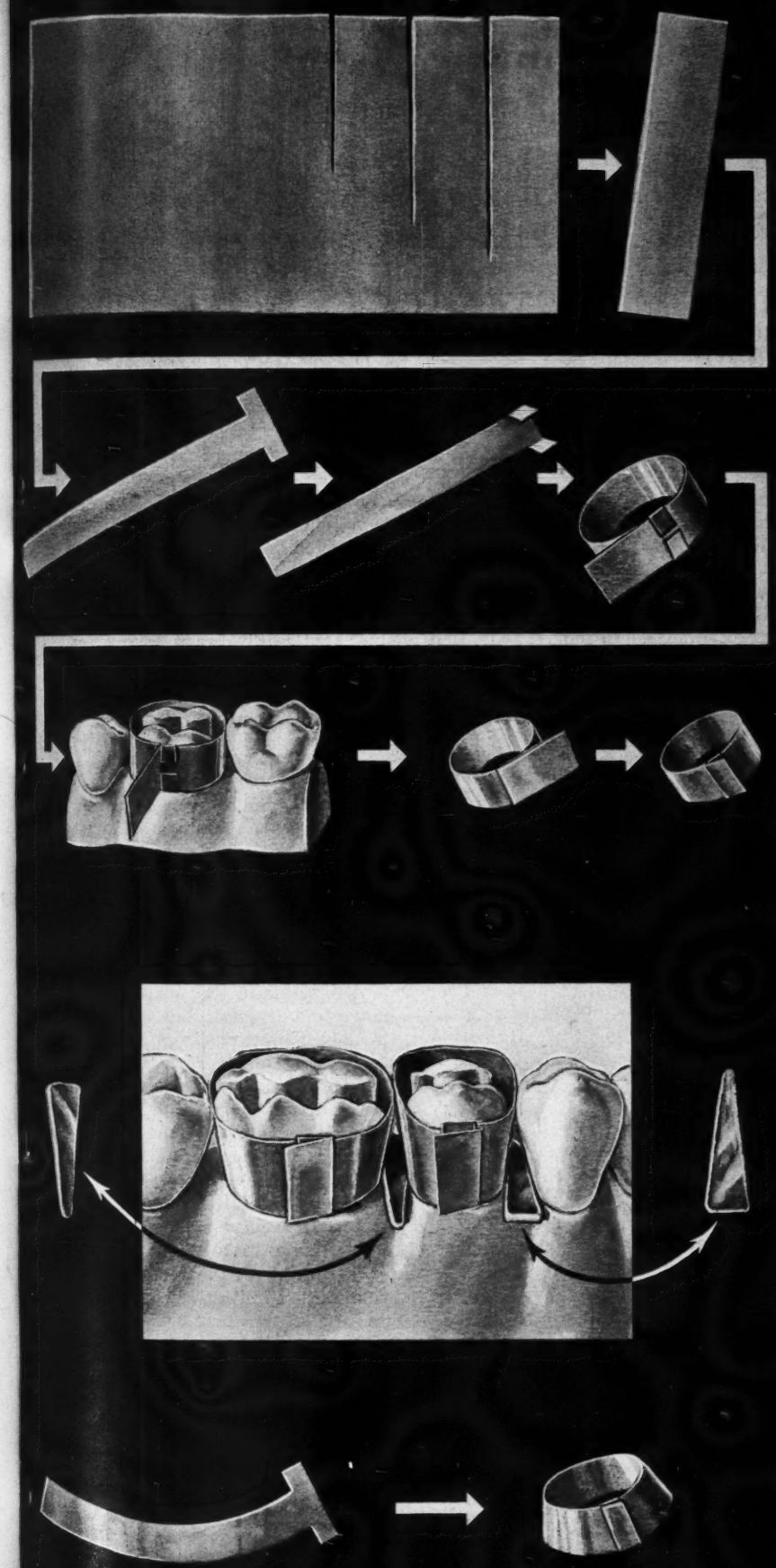
EXAMINATION FOR APPOINTMENT IN THE DENTAL CORPS, REGULAR ARMY

AN EXAMINATION for the selection of candidates for appointment in the Dental Corps, Regular Army, will be held during the period July 15-20, 1940, both dates inclusive.

The examination, which will include both physical and professional examinations, the latter consisting of written, oral and clinical tests, is open to male citizens of the United States who will be not over 32 years of age at the time it will be possible to render a commission, who are graduates of acceptable dental schools and who have had at least two years' subsequent practice in their profession at the time of appointment.

Candidates who fail a first examination will not be permitted to take more than one subsequent examination.

Full information and application blanks will be furnished upon request to The Adjutant General, War Department, Washington, D. C. Applications will not be considered after June 29, 1940.



Adjustable Matrix Band for Placing Amalgam Restorations

GILBERT V. KING, D.D.S.,
Milwaukee

THE FAMILIAR T-band may be used in conjunction with celluloid wedges (Fig. 4) to serve as a matrix. This simple method has the following advantages:

1. Because it is adjustable, the matrix is easily fitted to any tooth.
2. The band is not easily dislodged; therefore, it is especially indicated on deciduous teeth.
3. Adaptation at the gingival seat is readily effected, thereby preventing an overhang.
4. Ample allowance can be made with the wedge for the contact point.
5. The band may remain in place for adjustment to bite and the final carving of the restoration.
6. Unfolding the joint facilitates safe removal of the band.
7. The cost is negligible and the matrix is quickly and easily made.

A supply of various widths of bands should be kept on hand for use as required. The material used is .002 inch steel bearing shim stock, 2 inches wide.

The steps in making the adjustable matrix band are shown in the accompanying illustrations.

759 *North Milwaukee Street.*

Fig. 1—Blank.
Fig. 2—The T; T with cross bar bent at right angles; stem brought around and tabs bent over lightly to permit adjustment of size of band.
Fig. 3—After having been placed on tooth and adjusted to size, the band is marked by a slight kink at the tabs. After removal from tooth, excess material (which has served as a handle) is bent back over tabs and firmly pinched with pliers.
Fig. 4—Note wedges between teeth; also shown separately. Excess cut off and band ready for use, the joint serving as a landmark (buccal), with the cut off end toward the distal.
Fig. 5—By cutting T with curve, the band obtained is conical (bell-shaped), instead of being cylindrical (tubular).

The Mechanism of Oral Focal Infection

OTTO MEYER, M.D., New York

FOCAL INFECTION IS an infection somewhere in the body which pours bacteria or bacterial toxins into the blood stream and thereby causes disease symptoms elsewhere in the body. Infected teeth and tonsils are considered the most important sites of focal infection.

Experience has shown, however, that both infected teeth and tonsils have often been removed without benefit to the patient. In some cases of "rheumatism" the removal of infected teeth or tonsils brings immediate results; but in other cases, the removal of such infected teeth or tonsils may not relieve the disorder at all.

I believe that in most patients suffering from chronic septicemia caused by infected teeth or tonsils the jugular veins are sensitive to pressure. This symptom I have assumed to be the sign of a chronic latent phlebitis of the jugular veins. That my assumption was correct is shown by the excellent results obtained by removal not only of the infected teeth or tonsils but also of the co-existing jugular infection.

In discovering the connection between diseased teeth and latent chronic infection of the jugular veins, I believe[1] I have found the missing link in the theory of focal infection: Once the infection has progressed from infected teeth or infected tonsils to the jugular veins, it often becomes independent and forms a new focus; therefore, removal of the original focus in the teeth or tonsils without clearing up the secondary focus in the jugular veins cannot effect a cure of the condition caused by the focal infection, because the source of toxins has not been entirely removed. For all practical purposes the patient is no better than before removal of the infected organs; but as soon as the secondary infection of the jugular veins is also removed, the disorder will usually be corrected. In other words, a focal infection located in the teeth or tonsils soon spreads to the jugular veins and forms a secondary focus which often becomes independent. In order to cure the patient, it is necessary not only to remove the original focus in the mouth cavity but also to eliminate the secondary focus in the veins.

The eminent pathologists, Dietrich[2] of the University of Tuebingen, and Siegmund[3] of the University of Kiel have the distinction of first having studied the manner in which the infection spreads from acutely infected teeth and tonsils to the surrounding tissues. Their direct observations obtained during postmortem examinations and by microscopic examination of infected tissue prove that the infection progresses from infected teeth and tonsils to the jugular veins by way of the small connecting veins. The work of these two scientists puts the pathology of *acute* oral focal infection on a solid scientific foundation. On the basis of these facts I felt justified in assuming that *chronic* oral infections spread to the jugular veins in the same manner. The results obtained in chronic cases with my method of treatment proves the correctness of this assumption.

In this connection I want to emphasize the danger of pulpless teeth, which, in my opinion, are always infected, and therefore constitute a focus, whether they show active symptoms or not. Professor Oliver T. Osborne[4] of Yale University states in his book MOUTH INFECTION that he regards every pulpless tooth as being always infected. He expresses his opinion on this point by comparing pulpless teeth with "sticks of dynamite" which may explode at any moment, as soon as the power of resistance of the body is weakened by other diseases, notably by colds, and other infections of the respiratory tract. He is of the opinion that pulpless teeth under all circumstances have to be removed regardless of roentgenographic evidence. Experiments conducted in the Mayo Clinic and by Professor Meyer of Koenigsberg prove his contention to be entirely correct. Professor Meyer exposed the root canal of healthy teeth of young dogs by drilling a hole through the crown, removed the pulp, and filled the root canal and cavity according to the usual dental technique. After a short while these animals became sick, and examination of their blood disclosed the presence of a severe infection. The teeth which had been treated as described were then extracted and examined. They were invariably infected. These experiments prove two facts: that teeth always become infected when the nerve dies or is removed; and second, that pulpless and therefore infected teeth cause septicemia. Every pulpless tooth, therefore, must be regarded as a focus.

Sometimes the extraction of infected teeth is followed by fever and chills, and other symptoms of acute septicemia. In these cases there is a sensitiveness of the jugular veins to pressure. In my opinion, bacteria or their toxins, which are released into the blood stream by the manipulations during the extraction, stir up a latent infection in the jugular veins and cause a superimposed infection.

Tonsillectomy sometimes provokes in a similar manner a concealed infection in the jugular veins and thereby causes acute septicemia. In addition to septicemia, other acute infections have been described after tonsillectomy. Faber[5] compiled seventy-three cases from the literature in which poliomyelitis followed tonsillectomy. It seems to me that the tonsil area is the port of entry of the infantile paralysis virus in these cases. Apparently a latent infection in the jugular veins is activated by the operative measures in the tonsil area, and this activation of latent jugular phlebitis seems to predispose to poliomyelitis. Stillerman and Fischer[6] warn that tonsillectomy and adenoidectomy

[1]Meyer, Otto: The Interrelationship between Latent Jugular Phlebitis and Oral Focal Infections, Amsterdam, Acta Rheumatologica, March, 1938. Latent Phlebitis As a Cause of Rheumatism, London, Rheumatism, January, 1939. Das Krankheitsbild der latenten Jugular-Phlebitis, Zentralbl. fuer Innere Medizin, 1937, number 37. Latente Jugular Phlebitis als Ursache von Kopfstauung, Schweiz. med. Wchnschr. 1939, S.340. Die Beziehungen der latenten Jugular Phlebitis zur Fokalinfektion der Mundoehle, Ztschr. f. Rheumaforschung 1939, number 4.

[2]Dietrich, A.: Die Ausbretungsweise der tonsillogenen Sepsis, Ztschr. f. Laryngol., Rhinol. 23, H.3/4.

[3]Siegmund, H.: Ueber die akute Phlebitis der Halsvenen bei odontogenen Kiefererkrankungen, als Ausgang septischer Allgemein-Infektionen, Deutsche Zahnheilk. 74, S56/61.

[4]Osborne, O. T.: Mouth Infection, New Haven, Yale University Press, 1934.

[5]Faber, H. K.: Poliomyelitis after Adeno-Tonsillectomy, J. A. M. A. 113:2257 (December 16) 1939.

should not be encouraged during an epidemic of infantile paralysis. Logically this precaution is indicated also in tooth extractions during epidemics.

Every physician knows the danger of focal infection for the body. Professor Osborne[4] writes:

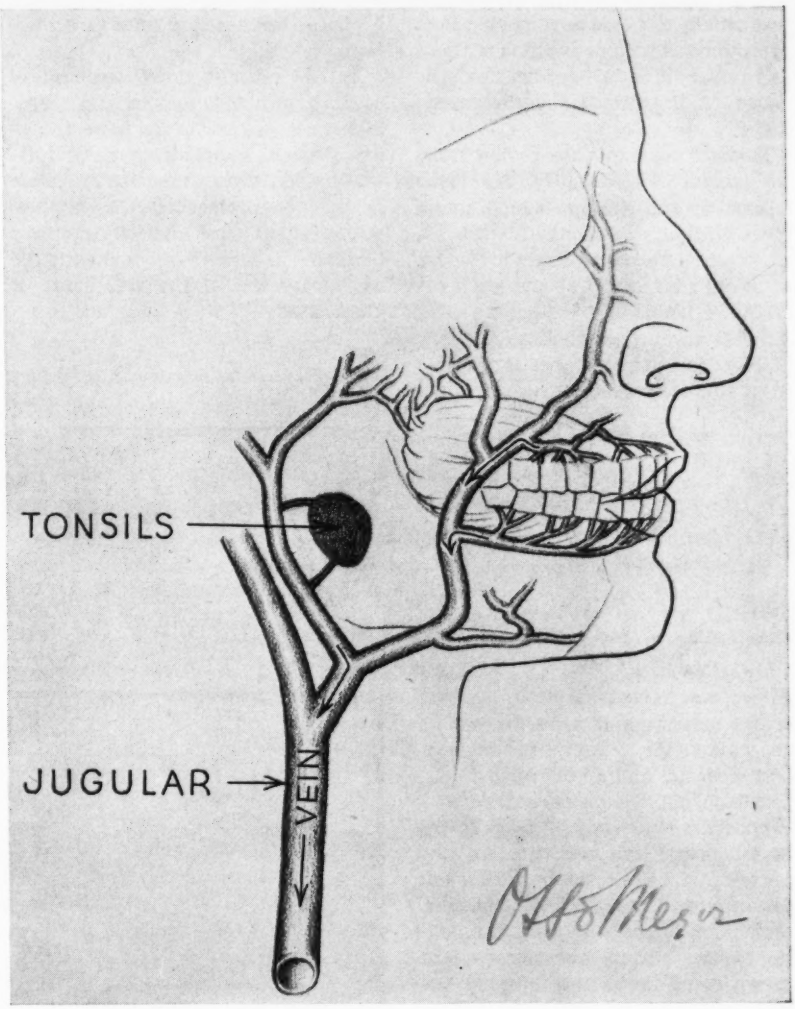
> It has been proved that mouth infection can cause all kinds and types of disease, from skin diseases, boils, carbuncles, rheumatism, and neuritis to the most serious types of endocarditis, ulcer of the stomach or duodenum, appendicitis, pyelitis, acute infection of a kidney, and chronic nephritis. Various endocrine gland disturbances, more especially of the thyroid, serious disturbances of the blood, and especially a general septicemia from streptococci may have their origin in the mouth. As above stated, pneumonia is not an unfrequent sequence of mouth infection.

Treatment

The fact that phlebitis is the cause of septicemia is generally too little known among dentists and physicians. The more dentists and physicians realize the importance of the latent infection of the jugular veins, the more success will be achieved by applying the theory of focal infection. In my search for a method of treating jugular phlebitis I was guided by my experience in the treatment of purulent phlebitis of the leg, which is the most dangerous but, fortunately, the rarest type of phlebitis. In such cases I had found that the application of leeches to the veins was the only treatment that produced excellent results. Thus in treating jugular phlebitis, I applied leeches on both sides of the neck over the jugular veins. This proved far more effective than any other method in eliminating the infection. It also is simple and causes the patient neither danger nor discomfort.

The number of leeches it is necessary to use in my treatment of jugular phlebitis depends on the severity of the inflammation, and on the age and weight of the patient. Once the leeches have fallen off the patient's neck, it is absolutely necessary to let the tiny wounds caused by their bites, bleed freely for about eight or ten hours in order to obtain satisfactory results.

Whether or not the infection of the jugular veins has been completely eradicated by such a treatment can easily be determined by the physician who tests the sensitivity of the veins to pressure. If the veins remain sensitive to pressure, the treatment should be repeated at intervals of about two weeks. One application of leeches is sometimes sufficient to clear up an inflammation of the jugular veins, but some cases may require a second, third, and in rare instances, several treatments to effect a complete cure.



Schematic drawing shows how infections spread from infected teeth and infected tonsils to the jugular veins by way of small connecting veins.

Although the use of leeches seems to be a simple matter, it should be undertaken only by a physician who is experienced in this treatment:

1. All the leeches must be applied in exactly the right spot in order to be useful. Somewhere in the neighborhood of the affected area will not do.

2. To force the leeches to bite exactly at the determined spot, a special applicator must be used.

3. The amount of blood that is to be allowed to drain from the bites during each treatment must be carefully controlled and adapted to the reaction of the individual patient.

4. During the treatment the patient must be carefully watched by a trained nurse who is experienced in this line of work in order to prevent complications.

Before the application of leeches the patient must be examined to determine the general condition of his body and to discover whether there is any suggestion of his being a bleeder, for the hemophiliac patient is the only person on whom leeches should not be used.

The value of leeches in treating diseases has been known since the dawn of history, but they formerly were used in a haphazard fashion which

[4]Stillerman and Fischer: Am. J. Dis. Child. 56:778 (October) 1938.

was usually directed at removing such symptoms as pain or swelling without any clear idea of eradicating the cause of the disorder under treatment.

Modern medicine has rediscovered the valuable benefits of the leech treatment and has put it on a sound basis. Ordinary methods of blood-letting cannot be substituted for the use of leeches inasmuch as the leech secretes a substance called hirudin which prevents immediate clotting of blood and thus makes it possible to let a patient bleed for several hours after the leeches stop their direct action.

At the present time[7] leeches are used more widely than is commonly recognized. In the newest English, French, and German medical literature constant references are made to the use of leeches. Christopher, author of the most modern American textbook on surgery, recommends the use of leeches in the treatment of phlebitis.

[7]Koskoff, Amshel and Lebeau: Arch. Pediat. 56:19 (January) 1931.

Summary

In many cases of oral focal infection the removal of infected teeth and tonsils is not sufficient to restore the health of the patient inasmuch as the infection often has already established a secondary focus in the jugular veins which causes the same symptoms as the original infection.

In all cases of oral focal infection the jugular veins should be examined, and if found infected, should be treated accordingly. The use of leeches is recommended in treatment.

200 *West Fifty-Fourth Street.*

Clinical Digest

Locking Device for a Bridge

C. N. VAN RIJSWIJK, D.D.S., The Hague, Holland

A WOMAN PRESENTED with a lower bridge consisting of a shell crown on the first molar, a pontic for the second bicuspid, and a gold inlay in the first bicuspid. The latter served as a support for the pontic. Gradually the first bicuspid had broken down and no retention whatever had been left for an inlay. I decided to make a shell crown. As the distance from the pontic to the cuspid was narrow, the crown could move only upward and downward and no tilting was possible. To give the pontic support, it would be necessary to take off the bridge and to cement it on later.

To cut off the pontic and to solder it to the bicuspid crown did not seem advisable as the main stress on the bridge would come in this case on the not too solid abutment which might give way easily.

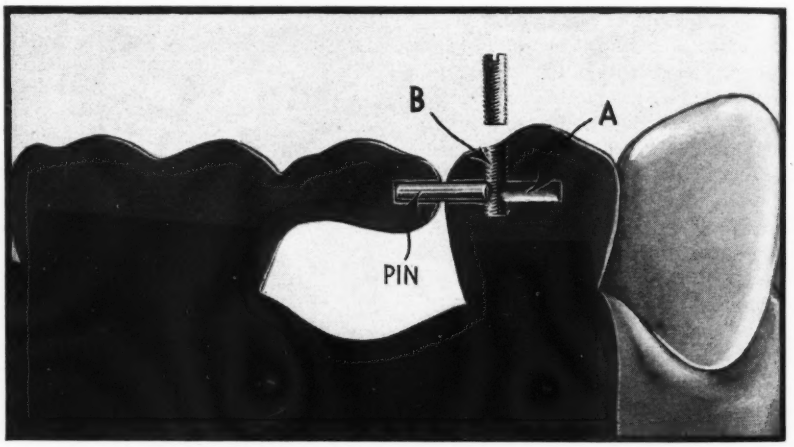
To take off the bridge, however, might prove a risk. It had been put in nicely and according to the patient, it had been necessary to reinforce the molar stump in order to place the crown. Its removal, therefore, might mean its destruction. The following steps were taken to prevent this danger:

Technique

1. A hole was drilled mesially into the pontic.

2. A pin of platinum gold was cut to fit this hole easily.

3. Then the band of the new shell crown on the first bicuspid was put on with a groove in its edge distally to let the pin slide through it.



4. The band was filled with wax and in this soft wax the pin could easily be moved sideways, thus giving the direction of tunnel A.

5. This channel was filled with a piece of lead pencil exactly the same gauge as the pin.

6. The surface was covered with wax and molded into its final bicuspid shape.

7. After the casting the lead pencil was drilled out and with a little measuring the spot could be marked where the back part of the pin was to be after it was pushed outward into the pontic.

8. On this spot a second hole B was drilled downward at a right angle through the first one. In this channel a worm of a screw was cut corresponding with that on a piece of orthodontic wire. When putting on the crown, the pin is completely pushed down its horizontal channel. Later it can easily be reached through the screw channel and be moved sideways into the pontic.

9. The piece of orthodontic wire is screwed down to lock the pin completely. This construction permits a little individual motility to the two abutments of the bridge and still gives ample support to the pontic. Complicated as it may seem, the procedure is simple and does not take much time.

160 *Groot Hertoginnelaan.*

The Editor's Page

TO ONLY A few are the power and the opportunity to make discovery given. There are more who have showered upon them the talents to synthesize, to crystallize, and to reconstruct new and better and challenging adaptations of basic discoveries. Two dentists show in this issue that imagination of this kind is not done; that effort is still guided in some places in the world by the wish to enlarge the benefits of life. Dentistry is only one small segment of human life. To us it seems an important one. It deals with comfort, with appearance, and with health. Discoveries and adaptations in the dental field are comparatively modest in the imprint on society. But without an attempt to make a comparative analysis of dentistry in the social scheme, it may be said that men who use their talents to explore the unknown quantities and qualities and build from these new combinations of them are scientists indeed.

Doctors Wilson and Harris who contribute their valuable reports to this issue are both practicing dentists. They are not isolated laboratory workers. Wilson in making cast inlays and crowns of plastic material does not suggest that the metals should be abandoned; nor does Harris believe that the porcelain jacket crown has lost its place in clinical dentistry to the acrylic resin jacket restoration. Neither suggests that his technique is to displace any existing method or material, but rather offers to dentists additional methods from which to make their choice of service. In talking to these authors separately, each recognized the merits of the method of the other. Both are making adaptations of modern plastics to dentistry—Wilson by using the casting process and Harris by using the usual technique for processing acrylic resins but adapting the material to jacket crowns. Neither deprecated the approach of the other nor his method. Next month in these pages the product of another man's perseverance and imagination will be expressed in an article by E. Byron Kelly who will describe a method of making a complete denture, base and teeth as well, in one procedure with the use of acrylic resin.

The imagination and the attitudes of these three men have diffuse implications in our modern life. Here in the United States men have been able to apply their talents and their labors to the arts of peace and the research of construction rather than to the diabolic tools and tricks of war; in other countries the laboratories, from which formerly came discoveries to prolong and enrich human life, now are pouring forth the means to destroy. In those countries their engineers formerly designed and their craftsmen executed structures for the comfort and inspiration of their fellows; now their talents are turned to destruction. Culture has turned itself into chaos. We have every reason to believe from the literature we see and the people we meet that the dentists in those countries once were like ourselves; they gave their energy and their skills to improve human comfort, appearance, and health. With the dislocation of war the state of the world may be compared with metabolic imbalance in which the catabolic phase outstrips the action of anabolism. Attentions are diverted, constructive undertakings are put aside, the spirit is depressed, and bitter, primitive vengeance is in the ascendance while progress is held in life suspended. What happens in the little segment of society in the practice of dentistry in the world at war is happening in all other fields as well. Men in other parts are destroying and defending themselves against destruction, torn temporarily from the arts and sciences of peace, for which direction, we would like to believe, the bent of their talents is intended and will soon be returned.

In the early months ahead, to which we look darkly, all of us may be faced with a turning from our tasks of peace to preparations to defend the traditions of our Land. None of us will be too old or infirm or indifferent to want some part to play. By freely giving of our energies now, by making small sacrifices at this moment, we may hasten the return of a time when talents and skills can be given back to the arts of peace and the sciences of construction. The hiatus of war is short only when the preparations for war are long.

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NOTES ON THE

Cuff

Doctoring to Death . . .

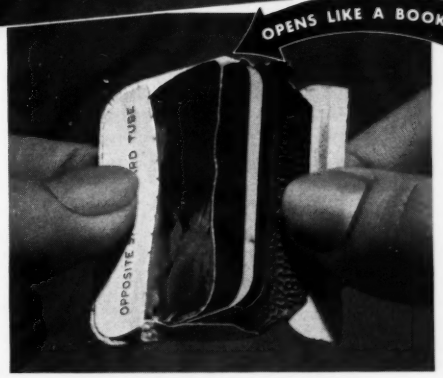
OUT IN THE country the wife of a dentist or physician is often saluted as "Mrs. Doctor." If the name is Slocum, for example, Mrs. Doctor Slocum will perpetuate the superfluity of titles by referring to her husband with a boastful, "The Doctor says . . . " Even in the presence of social equals, she may say in addressing her husband with unbecoming formality, "Doctor Slocum, will you have another cup of coffee?" This overworking of the title is a silly vanity.

Some of the worse offenders in the dental field are the dental supply men who punctuate every sales talk and every piece of sales copy with the word "Doctor," or worse still, "Doc." It is doubtful whether anything was ever sold on the basis of such excessive sycophancy.

If the day ever comes that we feel compelled to identify everyone by their vocations, some amusing situations may result. Picture, for example, Mrs. Plumber Plunket as she relates with indignation what her husband said to her the preceding evening. She says, "Plumber Plunket said to me, 'Leatrice, your soup is seepage.'" Or, Mrs. Haberdasher Harvey addressing her spouse over the morning coffee cups: "Haberdasher Harvey," she says, "will you have another bowl of Wheaties before you leave for your ties and garters?"

A New Note in Publication . . .

In the preface to their splendid text on orthodontia, LABIO-LINGUAL TECHNIC, Oliver, Irish and Wood express their acknowledgement to two amateur radio operators who made frequent communication among the authors possible during the preparation of the manuscript. It is a new high point in scientific text writing when co-authors can sit down in their own homes, separated by hundreds of miles, one from the other, and discuss freely back and forth what points should be covered in a manuscript. Being well acquainted with the three



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Eastman CC (Extra-Fast)—single emulsion; "fast" exposure; 5 minutes' development at 65° F.

Order the type preferred, today, in either the economical gross dispenser package or in 2-dozen packages. . . . Eastman Kodak Company, *Medical Division*, Rochester, N. Y.

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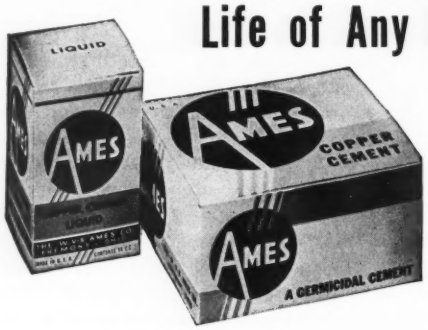

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authors, I can readily imagine them as they spent many chummy evenings together over the air waves.

Something Extra . . .

Everybody likes the extra touch that comes with services. The thoroughness of the service on the windshield impresses people more than the octane content of the gasoline. Eddie Ball of Cincinnati recognizes this principle when he tries to give his patients a little something in the way of information to take the sting from their monthly statements. On the back of his "For Professional Services" stationery, he tells his patients something about mouth hygiene and gives them a list of the foods having the essential minerals and vitamins.

Don't Say It . . .

There are certain words to which all of us are hypersensitive. One is "psychology." Whenever I hear a speaker use this word or see it in print, I have a tendency to go immediately into retirement. Too many salesmen have used the word and with it some of the tricks suggested by it. Despite the disfavor into which the word has fallen because of its glib use, there is such a legitimate study concerned with human behavior. A recent worthwhile contribution to the study is made by Dorothy B. Nyswander, Ph.D., writing in the *New York Journal of Dentistry* of April, 1940. Doctor Nyswander makes a big point of the ego which every person has as a normal possession. Only when it rises too much to the fore and consumes one as a form of self-love or narcissism does it become dangerous. Doctor Nyswander believes that more than anything else people fear those situations which may endanger or destroy one's ego. Attacks upon the real person, the self, the ego, are resented. By degrading, by depreciating, by attacking the self, the ego is undermined, and no one likes forces or persons that threaten the respect for the self. Nyswander states the case in these words:

"The ego resents these attacks from the outside world unless they are made in such a way that he accepts them as being part of himself, a part of his own thinking and feeling. All of his defenses of this ego, of this picture of himself rush forth to repulse

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Everett J. Higbee, Manager

the enemy's attack. Emotions, ideas, words are aroused. Angry, resentful, anxious, guilty, the 'self' seeks to re-establish not only its value in the eyes of another, but to re-establish its own integrity, its own picture. The individual is so busy defending himself he usually profits little through well intended directions. How can he? He is afraid of losing his own identity, of losing part of himself through its destruction by another. It is for this reason that criticism, *per se*, has no place in teaching children and no place in therapy. When a person wants to bring about changes in the behavior or attitudes of another person these changes must be brought about through the individual's belief that he has made his own decisions and directed his own course of action.

"The normal person has other fears. There are the fears of being thought unintelligent, of being thought physically unattractive or inadequate, of being unacceptable to the group with whom one is growing up or with whom one is working, of being considered socially inferior. Then there is the fear of humiliation which comes when one is the butt of laughter and teasing; the fear of being found making mistakes or doing the wrong thing; the fear of losing power and the satisfactions associated with power. There are fears of all sorts—some a part of our inheritance, some so naturally a part of ourselves, others decidedly custom-made. The ordinary fears we have learned toward objects or animals are minor in comparison to these."

The patient in the dental chair has fears: the fear of pain and the fear of price. We can do a great deal to dispell both. But the ego of the dental patient is something that we are likely to forget. In our zeal to do the dental job well, we forget that we are dealing with a sensitive human personality. This person does not want to be told that he is unattractive, that his teeth are ugly or badly diseased. This person does not want to receive treatment that will give him the sense of the loss of virility or attractiveness. In telling the story of dentistry to people, we should make every effort to speak as plainly as we can and to describe with scientific accuracy, but in the telling of the story, we must spare the soul, we must not forget the dangers of psychic trauma inherent in any talk that concerns

(*Continued on page 218*)

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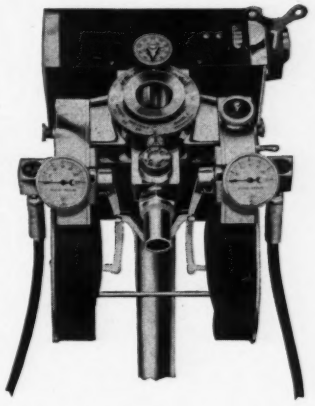

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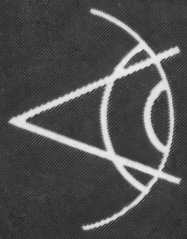

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human health and human appearance.

In the promotion of the science of dentistry there is some danger of losing some of the primitive arts. The primitive medicine man, for example, according to Doctor Nyswander, understood little about the science of medicine but a great deal about the man who had the disease. The medicine man had knowledge "not in terms of definitions but of intuitions. His therapy takes cognizance of the dignity and strength of the human ego. But he uses his knowledge of man in ways differing from those of the modern therapist. He capitalizes upon and intensifies man's emotions in order to produce physiological changes, whereas modern therapy calls for control and re-direction."

The chilly, austere chair-side manner may appear as a symbol of the man of science but the person who suffers from disease is frequently more interested in an understanding human consultant than in a scientific automaton. It is fine to have dentistry progress as a science dealing with materials and tissue behavior but we can never forget that these advances in science are to be directed to fill the needs of human personalities, no two of which are alike.

Things Learned
at a Dental Convention . . .

A public utility company in Springfield, Illinois announcing a new and noiseless gas stove describes it as being "silent as a lost golf ball."

Two companionate golfers, not long off the tee, usually in the rough, and always playing close together are described as having "drives like two mourning doves."

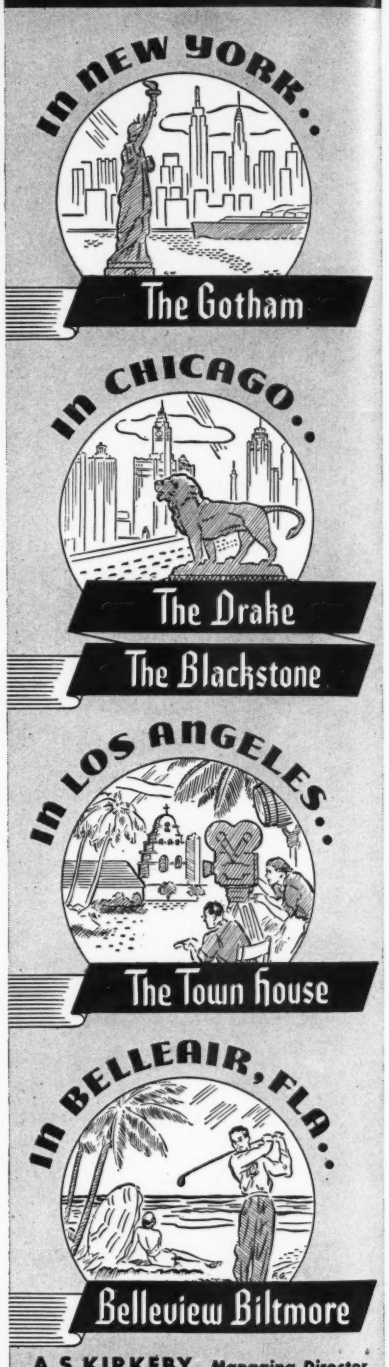
A group of night club drunks on the ragged edge of emesis alcoholic are trying hard to hasten the process by mentioning incongruous and incompatible food combinations. Two of the best—or worst—they suggest are the mixture of oysters and honey and a concoction of cold mutton gravy and warm beer.

"Pappy, pass the bicarb."—E. J. R.

State Board Meeting

The Board of Dental Examiners, Territory of Hawaii, will hold its next examination on July 25 and 26. For information write to Doctor Percy H. Wilson, Secretary, 75 Young Building, Honolulu, Hawaii.

YOUR GRACIOUS HOST FROM COAST TO COAST



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